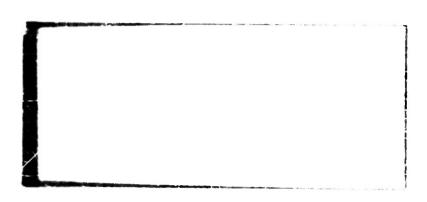
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General Mills, Inc. Mechanical Division





ENGINEERING RESEARCH & DEVELOPMENT DEPARTMENT

2003 EAST HENNEPIN AVENUE MINNEAPOLIS 13, MINN.

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GENERAL MILLS, INC. Engineering Research & Development Department Mechanical Division Minneapolis, Minn.

FIRAL REPORT

PROJECT 85017

DATE 17 SEPTEMBER 1953

POPPADED DV.

Reich C. Giles

Keith C. Giles

REPORT NO.: 1228

APPROVED BY:

J. R. Smith

Balloon and Neteorological

Systems Group

I. INTRODUCTION

On 1 October 1952, Contract Honr-875(00) between General Mills, Inc. and the Office of Naval Research was amended to provide for the execution of an experiment designed to carry scientific psyloads to high altitudes. Payloads were supplied by the Armour Research Foundation, Chicago, Illinois. General Mills, Inc. supplied "Skyhook" balloons to carry sloft the psyload instruments, balloon controls, recording and safety equipment. The flights were launched by General Mills technical personnel.

II. PROJECT PROGRAM

A traditional "Skyhook" balloon flight program was outlined for this project. One flight, #915, was flown from the University of Minnesota Airport, New Brighton, Minnesota. This flight was tracked and recovered by General Mills, Inc. technical personnel in a Stinson aircraft.

The remaining flights were launched from the Naval Air Station at Waldron, Texas.

Except as noted below, the equipment included in each flight consisted of the following:

- 1. A polyethylene balloon 85 feet in diameter and one mil thick.
- 2. A 28 foot parachute on which the scientific payload and balloon instruments descended to earth after being released from the balloon.
- 3. A timer set to release the load from the balloon at a predetermined time when the scientific experiment was concluded.
- 4. A safety device required by the C.A.A., consisting of a pressure switch set to prevent the bulloon from floating below 30,000 ft.

- Scientific payload provided by Armour Research Foundation,
 Chicago, Illinois.
- 6. A radio transmitter whose frequency is modulated by a pressure sensor.
 - 7. A barograph to record the altitude reached.
 - 8. Two 5-gallon time to act as floats for a water impact.

Helium for inflation was provided by the Navy. Inflation was carried out with the use of a platform to keep the "bubble" taut in the early stages.

The exceptions to the above equipment list is as follows:

- 1. The flight from New Brighton, Minnesota, used a 24 foot parachute, carried no float tins and used a radio-controlled release. Two control stations were activated, one transmitter, 100 watts, was located at the General Mills Laboratory at Minneapolis; the other transmitter, 40 watts, was carried in the General Mills tracking aircraft. The release was accomplished from the aircraft.
- 2. The first two flights from Texas, flights 941 and 942, and the last two flights from Texas, flights 949 and 950, carried no float tins. In addition, flight 950 used a 24 foot parachute.

A total of 11 flights were made under this project. The flight performance data are presented in the next section of this report.

One flight, 941, gave inaccurate pressure-height data, as checked with a theodolite, and another, 943, was torn in launching and lost equipment. The remaining 9 flights were all successful in balloon operation, the accessory balloon equipment showing excellent results and providing the

desired services. It is hoped that the scientific payload performed satisfactorily and that the entire operation met with success. General Mills, Inc. is happy to have had the opportunity of working with the Office of Naval Research and the Armour Research Foundation in carrying out these experiments.

Mechanical Division Engineering Research and Davelopment Department Minneapolio, Minneaota

YLICHY SUMMARY

Flight No.: 915

Balloon Serfal No.: 504

Date: 16 October 1952 Launching Time: 0810 Type: 851A Weight: 148t

Who: 8-5017 Armour Research Foundation

What; Armour Gondola

Duration: 3 3/4 hrs. to release by Load on Balloon: 1224

radio control.

Gross Load: 2707

Free Lift: 35# 13.3%

Maximum Altitude: 98,900 ft.

Hate of Rise: 611 ft/min to 70,000 ft.

Theoretical Altitude: 101,800 Altitude Maintemence: Excellent

Recovery: where? 10 Mi. SE Republic, Michigan when? Immadiate

Balloon Success: Good

Gritique: Air picked up by cell due to too slow a rate of rise and levelled

off below theoretical coiling. Load released by Church's radio re-

lease at Lake Superior's shore.

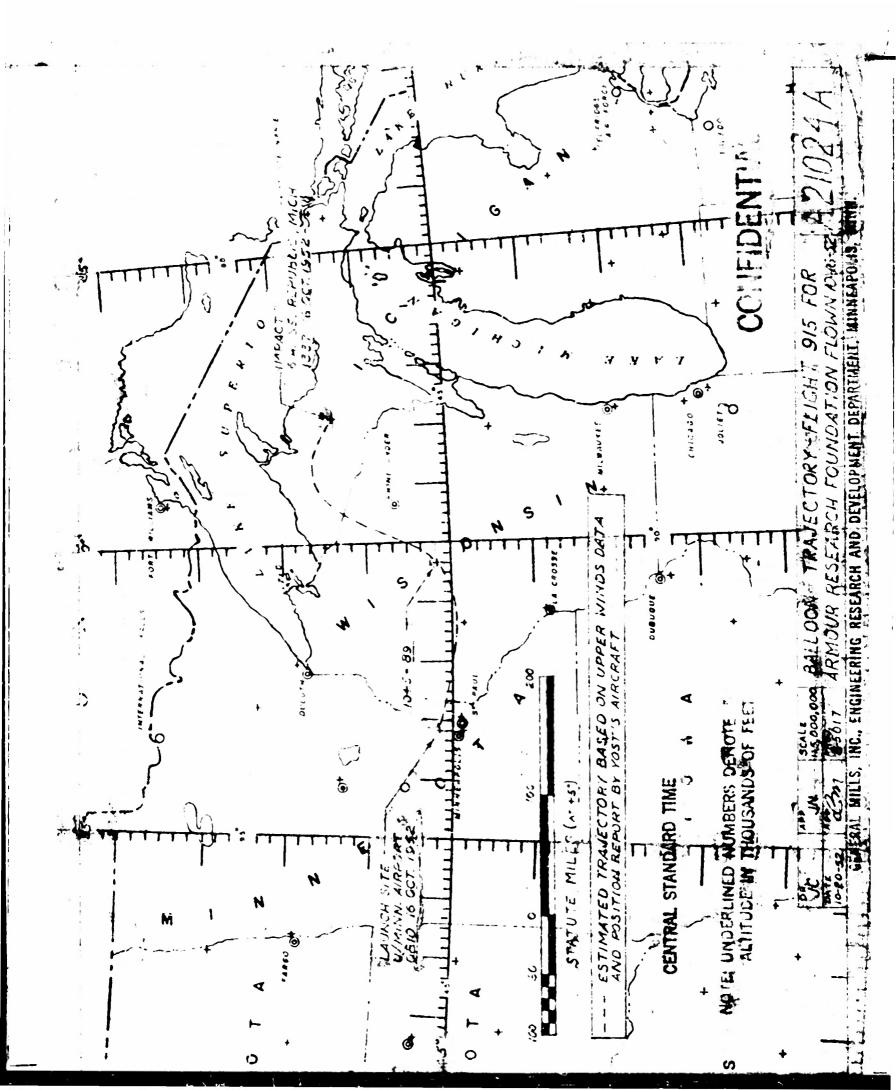
Flight Check of Telemetered Scintillation Counter Date

Scientific Purpose:

Scientific Success as known: Good

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GENERAL MILLS, INC., ENGINEERING RESEARCH AND DEVELOPMENT DEPARTMENT, MINNEAPOLIS, MINN.



GENERAU MILLS, INC. Engineering Research and Development Department Minneapolis, Minn.

PLIGHT SUMMARY

Plight No.: 941

Balloon Serial No.: 417

Tate: 2 November 1952 Inunching Time: 0846C Type: 851A Weight: 163#

Who: 8-5017 - Armour Research Foundation

What: Armour Gondola

Load on Balloon: 113#

Duration: Scheduled - 4.5 hrs. from 0820: Actual - 3.9 hrs.

U; Actual ~ 5.9 mrs.

Gross Lead: 276#

Free Lift: 48# 17%

Maximum Altitude: 95,000 estimated

Hate of Rise: 1068 ft/min to 68,350 ft.

Theoretical Altitude: 101,600 ft.

Altitude Maintenance: Good

Recovery: where? none, impact at sea

Jalloon success: Good

fritique: High rate of rise, did not reach theoretical ceiling by telemetering

though double theodolite readings indicate it.

Flight Chook of Tolomotored Scintilladies Counter Into

Scientific Purpose:

Scientific Success as known: Incorrect Altitude information made calibration

impossible.

GENERAL MILLS, INC. Hechanical Division angineering Research and Development Department Minneapolis, Minnesota

FLIGHT SUMMARY

Plight No.: 942

Balloon Serial No.: 401

Date: 3 November 1952 Launching Time: 06300

Type: 851A * Weight: 126#

Who: 8-5017 Armour Research Foundation

What: Armour Condola

Duration: Sched. 8 hrs. from 0630 Actual Unknown

Load on Balloon: 113#

Rate of Rise: 1012 ft/min to 94,100 ft.

Gross Lond: 239#

Free Lift: 37# 15%

Maximum Altitude: 95,100

Theoretical Altitude: 104,600

Altitude Maintenance: Good

Recovery: where? None

Balloon Success: Excellent

Critique: High initial rate of rise and flight did not reach theoretical ceiling. Maximum timer setting did not produce recovery as anticipated. Scintillation telemetering (6425KC) faded before altitude telemetering (1746KC) faded indicating flight proceeded Leyond skip distance.

*.0005 wall balloon.

Scientific Purpose:

Plight Creck of Telemetered Scintiliation Counter Lata.

Scientific Success as known: Good

GERFRAL MILLS, INC., ENGINELRING RESEARCH AND DEVELOPMENT DEPARTMENT, MINNEAPOLIS, MINN

GENERAL KILLS, INC.

Mechanical Division

Engineering Research and Development Department Minucapolis, Minnesota

PLIGHT SUMMARY

Flight no.: 944

Balloon Serial Fo.: 412

Date: 11-3-52 Launching Time: 06490

Type: 851A Weight: 161#

Who: 8-5017 Armour Research Foundation

What: Armour Gondola

Duration: Sched. 4 hrs. from 0617

Load on Balleon: 118#

Actual 3.7 hrs.

Gross Load: 278

Free Lift: 344 125

Maximum Altitude: 99,200

Rate of Rise: 593 ft/min to 45,250 ft.

707 ft/min to 92,200 ft.

Theoretical Altitude: 101,400

Altitude Maintenance: Good

Hecovery: where? Mone - impact at sea.

Balloon Success: Good

Critique: Cell picked up air on ascent with slow rate of rise due to probable

gus measurement error. Telemetering poor due to operation of second

SBG in vicinity.

Scientific Purpose:

Flight Check of Telemetered Scintillation Counter Data.

Scientific Success as known: Hegatite

53 12 13 14 14 14USS 20 3 200 3 300 3 3 3 5 SCHEDLLED DURATION 4 MOURS FROM DELL 75-4-12 DURATION TO RELEASE 3.7 HOURS 14PACT AT SEA 1432 . 11-6-52 EOR ARHOUR RESEARCH FOUND ITTON LACON TYPE MUSTER MATERIA 3 ELL PARO LIVE IN HOURS CENTRAL STANDARD TIME S HOY INDE FLIEST NO SES LOAD IN BALTOOK 416 FLONK THE GAR BEACON THENKE TATIO SILE NARW WALDROHE-LEVAS スーベーニ RATE OF RISE 707 45, 280 F Filliam 45.250 393: HT/HIM 1 32,450 2 3 2 \$ Ē AL SQUITTA

GENERAL MILES, INC., ENGINETRING RESEARCH AND DEVELOFMENT DEPARTMENT, MINNEAPOLIS, MILIN.

GEICHAL MILLS, INC. Mechanical Division Engineering Research and Development Department Minneapolis, Minnesota

FLIGHT SUMMARY

Flight Ho.: 945

Balloon Serial No.: 414

Date: 11-11-52 Leurching Time: 0651.6 Type: 851A Weight: 160 1/2

Who: 8-5017 Armour Mesearch Fountation

What: armour Gondola

Duration: Sched. 4 hrs. from 0645 Actual 3.7 nrs. from 0651.6

Load on Balloon: 119#

Gress hond: 270#

Free Lift: 35# 12 1/2%

Maximum Altitude: 95,100

Rate of Hise: 991 ft/min to 93,900 ft.

Theoretical Altitude: 101,200

Altitude Maintenance: Excellent

Recovery: where? impact in sea

Belioon Success: Good

Critique: Bate of rise high and theoretical ceiling missed by 7,000 ft.

Scientific Purpose:

Flight Uneck of Telemetered Scintillation Counter Data.

Scientific Success as known: Megative

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DATE OF THE MINISTER COMPANY BETTER OF

CEMPERS MILLS, SHC., ENGINEERING RESEARCH AND DEVELOPMENT DEPARTMENT, MINNEAPOLIS, MINM

GENERAL MILLS, LAC. Hechanical Division Engineering Research and Development Department Hinneapolis, Minnesota

YLIGHT SUMMARY

Might No.: 946

Balloon Serial No.: 513

Date: 14 November 1952 Leunching Time: 0816.80 Type: 851A Weight: 144#

Who: 8-5017 Armour Research Foundation

What: Armour Gondola

Duration: Sched, 3 hrs. from C815

actual 2.9 hre.

Load on Balloon: 126#

Gross Load: 270r

Free Lift: 45# 17%

Maximum Altitude: 102,000

Rate of Rise: 1053 ft/min to 96,000 ft.

Theoretical Altitude: 101,900

Altitude Maintenance: Good

Recovery: where? lione - impact at sea

Balloon Success: Excellent

Critique: High initial rate of rise. Beacon apparently free fell as 6425 KC

signal very weak and 1746 KC went out 8.1 minutes after release.

Flight Check of Telemetered Scintillation Counter Dates

Scientific Purpose:

Scientific Success as Known: Megative

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GARBRAL MILLS, INC. Machanical Division Engineering Research and Development Department Hinneapolis, Minnesote

FLIGHT SUMMARY

Plight No.: 947

Balloon Serial No.: 514

Date: 11-19-52

Launching Time: 0659,40

Type: 851A Weight: 148

Who: 8-5012 Armour Research Foundation

What: Armour Gondola

Duration: Sched. 8 hrs. from 0653

Actual 7.7 hrs.

Load on Balloon: 1144

Gross Load: 261#

Mreo Lift: 34# 13%

Maximum Altitude: 98,000

Bate of Rise: 927 ft/min to 82,500

Theoretical Altitude: 102,800

Altitude Maintenance: Fair

Recovery: where? None - impact at sea

Balloon Success: Good

Gritique: High rate of rise and failed to reach theoretical cailing by 5,000 ft.

Longer duration employed in endeavor to recover instruments.

Scientific Purpose:

Flight Check of Telemetered Scintillation Counter Data

Scientific Success as known: Negative

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7.1 HOURS		SE. [142.0	KURABER SETTER	ARCH		12 F 1. 54 5 13 5					0.8. 12-1-52 APPROVED	
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GENERAL MILLS, INC. ENGINEERING RESEARCH AND DEVELOPMENT DEPARTMENT, MITHERPOLING MILL

Flight No.: 948

Date: 11-22-52 Launching Tim

Who: 6-5017 Armour Institute

What: Armour Gondolm, Beacon

Duration: Sched. 3.5 from 0653

Actual 3.4 hrs.

Gross Load: 261#

Maximum Altitude: 93,500 ft.

Theoretical Altitude: 102,800 #

Recovery: where? Mone - impac

Bailoon Success: Questionable

Critique: Rate of rise high au-

tied off loosely, th

launched believed re

Scientific Purpose: Flight Check

Scientific Success as known: 1.

GENERAL MILLS, INC. Mechanical Division Engineering Mesearch and Development Department Minneapolis, Minnesota

FLIGHT SUMMARY

Ylight Mc.: 949

Balloon Serial No.: 515

Date: 11-24-52

Launching Time: 07220

Type: 851: Weight: 145#

Who: 8-5012 Araour Research Fountation

What: Armour Gondola

Durntion: Sched. 3.5 hrs. from 0720

Actual 3.4 hre.

Load on Balloon: 116#

Gross Load: 261#

Free Lift: 37v 14%

Maximum Altitude: 94.850

Hate of Rise: 803 ft/min to 94,850 ft.

Theoretical altitude: 102,800

Altitude Maintenance: Good

Recovery: where? None - impact at sea

Balloon Success: Good

Critique: Ceiling missed by 8,000 ft. Extra gas added to compensate for satura-

tion of flight gear, mylonaend belloon in rain showers. Very fast

launch. OB served wind at MAS Corpus 18K 3 0727C.

Flight Chart of Toloratored Cologs liction Counter Data.

Scientific Purpose:

Schentific Success as known: Magative

HOURS FROM UTIC			BUNDER HATTRICK METORY STORY APPENDENT	949 B SCASCL FOUNDATION	26 20V 1352 N BALLOJN 1108	3/3 • 1 • .		7105 8	APPROVED FILE	7-127777-7
SCHEDMEED DURATION 3.3 HOURS FROM UTLU BURAT GR TO RELEASE 3.4 HOURS	LOAN RELEASE, 1047		SALCON TABL	FLIGHT HO	FLOWN 2's MOV 1	FREE LIFT		1123 , 11-24-52		0971
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9			•						म्म भ्रम्पायड	IUCU ANDARD TIPE
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2		RATE OF R. BOS							1/2	0730

GENERAL MILLS, INC. Machanical Division Engineering Research and Development Depurtment Minneapolis, Minnesota

FLIGHT SUMMARY

Flight No.: 950

Balloom Serial No.: 517

Date: 11-30-52

Launching Time: 0822.50 Type: 8514

Weight: 151#

Who: 6-5017 Armour Research Moundation

What: Armour Gondole

Duration: Schod. 3.5 hrs. from 0810

3.2 hrs.

Lond on Balloan: 107#

Gross Load: 258#

Free Lift: 43r 17%

Maximum Altitude: 103,350

Rate of Rise: 890 ft/min to 101,400 ft.

Theoretical Altitude: 103,100

Altitudo Maintenance: Excellent

Recovery. where? None - impact at sea

Balloon Success: Excellent

Critique: Extra lift added to compensate for loss of gas through split inflation

tube approximately 35° from appendix, and for rain and mud on flight

genr.

Scientific Purpose:

Flight Check of Telemetered Scintillation Counter Data

Scientific Success as Known: Counter malfunctioned.

	<u>9</u>		90 	<u> </u>	097	35.	3.00	989 989 989 989		
SCREDULED DURATION 3.5 HOURS FROM USING DURATION TO RELEASE 5.2 HOURS	LUAN KELEASE, 1135.1	The Media patabal of the six and six a	FUR ARMOUR					124 . 14-30-52		
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										25
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